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ABSTRACT

This paper discusses the working principles that have grown out of the experiences of an architect and a psychologist working together as a planning team. According to the author, the true problem in planning and design is the prediction of behavior. Therefore, although the basic problems should be handled by the designer, a psychologist can employ his specific tools to advance the goals of a planning or design group. For example, a psychologist can make quantified measurements of behavior for programing functional requirements; utilize experimental techniques in evaluating particular design variables; and construct surveys, case studies, and similar measurements for the validation of planning criteria. (Author/MLF)

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MULTI-DISCIPLINARY APPROACH TO PLANNING

LAWRENCE WHEELER AND EWING MILLER

When professionals from different fields get together to plan something, the real problem is a matter of mutual education. The Tower of Babel is marvelously easy to build. Every multi-discipline group knows just how to do it.....and usually does it.

So what can I talk to you about, today, that is at all likely to improve the situation?...I have decided to discuss eight working principles we have evolved, four generalizations we have learned to avoid, and three sets of tools that the psychologist can bring to the solution of the designer's problems.

Ewing Miller and I have been blessed in our relationship as architect and psychologist. We were good friends as freshmen in architecture school. Because of that, we have known, for a long time, how to talk to each other. Then, because Ewing is a humane man first and a planner second, and I am a student of perception, our mutual interest in people's responses to environment has always been strong and pervasive. Finally, our wives like each other.

On this happy basis, our working association has endured ten years. We are, if not a multi-disciplinary, at least a bi-disciplinary team. From that background perhaps our observations about planning, as a function of cooperation among various professionals, will have some merit.

Let me tell you a little fable that illustrates some of the things we have learned:

Once upon a time a planning group was formed to design a house for an elephant. On the committee were an architect, an interior designer, an engineer, a sociologist, and a psychologist. The elephant was highly educated too..... but he was not on the committee.

The five professionals met and elected the architect as their chairman. His firm was paying the engineer's salary, and the consulting fees of the other experts, which, of

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course, made him the natural leader of the group.

At their fourth meeting they agreed it was time to get at the essentials of their problem. The architect asked just two things: "How much money can the elephant spend?" and "What does the site look like?"

The engineer said that precast concrete was the ideal material for elephant houses, especially as his firm had a new computer just begging for a stress problem to run.

The psychologist and the sociologist whispered together and then one of them said, "How many elephants are going to live in this house?"...It turned out that one elephant was a psychological problem, but two or more were a sociological matter. The group finally agreed that though one elephant was buying the house, he might eventually marry and raise a family. Each consultant could, therefore, take a legitimate interest in the problem.

The interior designer asked, "What do elephants do when they're at home?"

"They lean against things," said the engineer. We'll need strong walls."

"They eat a lot," said the psychologist. "You'll want a big dining room....and they like the color green."

"As a sociological matter," said the sociologist, "I can tell you that they mate standing up. You'll need high ceilings."

So they built the elephant his house. It had precast concrete walls, high ceilings, and a large dining area. It was painted green to remind him of the jungle. And it was completed for only 15% over the original estimate.

The elephant moved in. He always ate outdoors, so he used the dining room for a library...but it wasn't very cozy.

He never leaned against anything, because he had lived in circus tents for years, and knew that walls fall down when you lean on them.

The girl he married hated green, and so did he. They were very urban elephants.

And the sociologist was wrong too....they didn't stand up. So the high ceilings merely produced echoes that greatly annoyed the elephants. They moved out in less than six months.

Moral - elephants don't understand committees.

Or, more seriously: the true problem in planning and design is the prediction of behavior

To understand, to forsee, how people will react to a constructed space, is to have the power to design that space successfully.

Except in a rather general way, we all lack this understanding, this foresight, this power, today.

That is not meant to be an insult to the design professions. Designers and architects, in fact, often solve their problems in most ingenious and elegant ways, ... quite unbiased by research data!

And it is not meant to be an insult to the various tribes of behavioral scientists. Psychologists, sociologists, anthropologists, educators, even geographers, all are trying vigorously to provide data and insights concerning the effects of environment on human behavior Some of us are pretty wordy as we go about it, too.

Meanwhile, Ewing and I have gradually found that a few homely principles lie at the roots of our joint efforts to solve design and planning problems. These are highly personal conclusions, but we present them to you in the hope that one or two might be useful to someone besides ourselves.

First: basic problems come from the designer. He has to make specific decisions about particular, physical things and relationships. He doesn't really want an education in social psychology. He wants to know: What color? How long a corridor? How large a space? How close to a window? What temperature? and so on. From these questions the behavioral scientist may form a more generalized problem area, but he will provide an unwanted service if he tries to invent the problems himself.

Second: we believe there is great utility in systematic questioning of the users of the spaces we design,

but the questions must have face validity for the respondent. They must be relevant to his needs, his welfare, his pleasures, his success on the job. Highly abstract questions fail. Questions based on floorplans or maps fail, if the diagrams are too schematic. Both condecension and paternalism fail, and are impossible to disguise. A question that angers or annoys a respondent can invalidate all his answers....So we place great emphasis on relevance, simplicity, and diplomacy in our questions. We do not let engineers write them!

Third: questions can be so inter-related as to produce weighted relationships among many design factors in a given situation. Typically we employ a hierarchical structure of enquiry that gives us detailed information about clusters of related design components and then yields relative values among a series of such clusters. For example, we have found that, considered alone, plants and shrubs are highly valued in the office environment, but when ranked among twenty important characteristics of offices, such as good work space, good ventilation, and so on...natural greenery takes sixteenth place!

Fourth: it is possible to scale questions in a way that is almost as reliable as the paried-comparison technique, is demonstrably better than the straight rank-order method, and is less time-consuming than either. Our system involves a list of options from among which the respondent picks one - sometimes two - top choices and one - or two - low choices. These choices represent, for him, items of greatest and least relevance in some particular sense specified in the instructions. The scale value for each option, over a group of respondents, is just the item's percentage share of all positive choices, minus its percentage share of all negative choices. The resulting numbers are not directly comparable to scale values for other sets of items, unless standardized, but the relative strengths of all options are easy to read when these numbers are graphed. About the statistical significance of differences we take a somewhat cavalier attitude, namely: these are the data we have, let's make the most of them. In practice this had done no harm, since differences between crucial items have usually been clear and, at least in retrospect, logical. A more serious problem is that scale values near zero may be generated either by large, but balanced, differences of opinion, or by low frequencies of response to an item. Inspection distinquishes these cases, so we always include the necessary frequency data in our tables.

Fifth: good communication between the designer or planner and the behavioral scientist is a slow-growing shrub, best nurtured by liberal applications of leisurely social intercourse and infusions of alcohol... I know of no other ways to force-feed this plant. If our own experience is any guide, then I would say that we should catch our professionals very young - during college if possible - and see that they interact from then on. Let's not wait until they grow up into a lot of arbitrary opinions about what's important!

Sixth: cooperation between planner and social scientists, or, indeed, between any two professionals, need not imply a common goal, but it does imply that the joint activity meet someone's minimum standard of effectiveness. In the last analysis, only the user of the outcome of the cooperation can say whether the solution or the design was successful. He doens't, of course, usually get to do this, except very indirectly.. such as by burning the place down.

I am being a little satiric only to emphasize a point: cooperation between architect and social scientist is not enough. The net must be spread wider. Client and user must be caught in it too. And the disparate goals of these four persons or groups must also yield a solution that satisfies the community in general, or, at least, does not seriously annoy it. Any other outcome, today, is immoral. This, however, creates a new problem: we know that effective cooperation can sometimes occur where n equals 2, becomes difficult where n equals 3, very difficult at 4, almost impossible at 5, and virtually impossible at 6..... so we are just under the wire, unless someone thinks of another interested party...such as government? Seventh: we have learned to remember one intensely practical matter. As with teachers and students, or doctors and patients, there are some architects and scientists who can never communicate except in the most superficial way. There is no general rule for across-the-board success in achieving effective communication. Goodwill, diplomacy, and a strong interest in common problems are not enough. We suspect that a common background outside of the differing professional fields might help, as might a strong need for the approbation of the "other one". We are virtually certain, however, that self-satisfied people, self-styled "experts", are poor communicators. They may be good talkers, but they are poor communicators.

Sadly, many of them are cleverly disguised to look like the rest of us.

Eighth: a major conclusion - after you have done something as a team, go back and try to evaluate what you did. This is most enlightening. You might have to start all over, but communication will take a quantum jump.

There you have some of the insights that have made our interdisciplinary association productive over the years. We have also learned to be extremely wary of appealing generalizations. I believe this is a chief virtue of multi-professional planning teams. If one man has fallen victim to a generalization, someone else is certain to mention the matter....often without the least trace of impoliteness.

Let's look at a few such generalizations. Ones that have some relevance for the planning of constructed environments. For instance: "Crowding is bad. It makes people mean, hostile, and aggressive". Is this true?....There are cultures in which high density has been the normal condition for generations. A person removed from such an environment, and placed in a more spacious one, may feel unloved, alienated, cold - both physically and emotionally - and lost.

A like or dislike for proximity to other people is a relative matter, a cultural habit, at least up to some physiologically detrimental level of crowding. People boil each other, if packed too closely.

Another generalization: "Warm colors should prevail where ever more than a few people are to be together for more than a few minutes." I have seen this one in print, in a fine publication by a notable team of architects and planners. Well, we do know, for chickens, that green light promotes rapid growth, a yellow light produces docility, and red light reduces cannibalism. Probably the human response is even more complicated - it usually is.

Research on humans leads us to suspect that red light has greater arousal characteristics than does blue or white light, and that it does affect physiological responses such as heart rate and systolic blood pressure.

We suspect that blue illumination produces more feelings of comfort and relaxation, red light more tension and excitment.

From work performed in my laboratory I know that people perspire more freely in red illumination (with temperature controlled), and that pain thresholds are raised. A subject will give himself a more painful stimulus under red than under several other illuminants.

On the other hand, when asked for abstract color preferences, by far the majority of students in our extensive samples have given blue or green as top choices.

All this is typical of the color information that is available to designers. It isn't very helpful. Can we say, for example, "If people are like chickens, then they won't eat each other as often in red light, but if they do, it won't hurt as much?" Clearly the problem is complex. I will venture one statement: when the data are all in, it will turn out that a change in illumination is more powerful in its effects on behavior, than is any steady condition of lighting.

Now, a third generalization: "Architectural spaces should be clear and comprehensible. A person should have an immediate sense of orientation in them, should know where he is, and know what leads to what. Ambiguity makes people uncomfortable."

Well, here, indeed, we have a debatable issue. Some people enjoy exploring caves. Others hate this activity with an intensity that amounts to fear. Some people love the closed in effect of a deep forest. Others seek open deserts or ocean expanses. People differ, not just in their ability to withstand ambiguity in their surroundings, but in the vigor of their search for ambiguity. And each person may differ, within himself, from time to time, in this characteristic.

We know, however, that average people, confined to a small, plain room, will press a button much more often to see an irregular, unpredictable pattern of lights, than they will to see a regular, symmetric arrangement. Visual stimuli of high information content, that is unpredictable ones, are rewarding in the same sense as are food, water, and sex. Some investigators believe that complexity and ambiguity in the environment are

necessary for the health and effective functioning of organisms. Experiments on sensory deprivation tell us that very little stimulation is probably too little, and we know that animals deprived of early stimulation differ from their litter-mates in unhealthy ways. The same is true for children, we believe.

How does all this help the designer or architect? Should he now conclude that simple, clear, unambiguous spaces are not just dull, but actively pathogenic? If he introduces vistas, sudden focal points, varied textures and patterns, has he become a therapist? If so, I say "Thank God for antibiotics and modern surgical techniques!" We just don't have enough data avout the effects of complexity and ambiguity on humans, to make rational decisions.

How about a generalization concerning noises? - "Noise is bad. Noise-pollution hurts people physically and emotionally. Harsh acoustics in the home can cause divorce." And so on.

The other side of this issue includes "white noise" to suppress other noise, noise stimuli to help patients withstand dental pain, the evident joy that noise creates in the young, or that they take in creating it. and the substantial discomfort produced in many people by true, anechoic silence. Again, we do not really know how much is enough. Perhaps variety is the best solution. Have loud places. Have quiet places. Have places that can be either. But emphasize control. Let the person vary his own sound enviornment. The true damage caused by noise pollution is, I suggest, to the ego. We are imposed upon by other people's noises. If we create large sounds, that's fine, and the by-product of some useful activity. If the neighbor's kids make the same sounds, that's pollution.

So, in one way or another, we are less then certain, for design purposes, about optimum density of people in spaces, abbiguity or complexity versus simplicity or clearity in designed environments, the possible effects of color on health or morale, and about the functional effects of noise. These aren't the only open-ended questions, either.

Of such generalizations as these, however, we have helped each other to be aware, so that they have come to mean research problems, to us, rather than planning solutions.

And that might lead you to wonder what contribution a psychologist can actually make, in furthering the goals of a multi-disciplinary planning group. Our mutual work has centered chiefly around design problems, some specific to a single building, or series of buildings, some as general as an entire campus, so let me discuss the psychologist's contribution by analyzing the design problem itself.

There are three basic parts to this problem, and for each of these there is an appropriate set of psychological techniques.

First, when a problem is presented, the designer trys to obtain exact information of certain kinds. He actually does ask, "How much money is there?", and "What are the site characteristics?", but also, "What behavior is to occur in the constructed spaces?" He looks at cost limitations, site data, and functional requirements. These are the basic program contingencies.

Concerning the functional requirements, within the program contingencies, psychologists are specialists in observing and describing behavior in precise terms. When the planner needs to know what goes on in an office, a park, a school, a factory, a hospital, a home, or in an urban region, so that he can design spaces that will enhance and support particular functions, behavioral scientists can help. They are trained to observe and categorize behavior in ways that will permit quantitative description. This is exactly what is needed for architectural programming.

Controlled and quantified observation is, therefore, the first area in which psychology can be useful to designers.

Second, with the program contingencies in hand, the designer begins to make design choices. These include structural choices, aesthetic choices, and decisions about spatial relationships. Here, indeed, I think the psychologist may ultimately make his major contribution to planning, because this is where experimental

techniques and methodology appear to be most needed. Here we should study the effects of changes in elements of the designed environment. What happens to behavior when illumination, or color, or texture, or sound-dampening or traffic patterns, or space-relationships are manipulated? What must we do to ensure that only the variable we are interested in, is having an effect?

What we do about the fact that humans often adapt to environmental stimuli, even bad ones. When is it important to consider these things, as we evaluate design alternatives:

Applications of the experimental method can help answer these questions and, therefore, form a second large area in which psychology can make itself useful to architectural planners.

And third while making design decisions, the planner asks himself, or should ask himself, "Will the result be sound?" "Will it be pleasing?" "Will it work?" He is thinking in terms of structural standards, aesthetic principles, and indices of efficiency and comfort. These are the major planning criteria that must be satisfied by the design.

With respect to such planning criteria, there are techniques in psychology that are of some value. If the designer wants to check the accuracy of his predictions about whether a finished design will be pleasing, or whether it will work, then he must, eventually, find out whether his results did, in fact, work and were, in fact, pleasing. He must go back and check up on the finished product and then apply the resulting information to his next set of predictions. Only so do we make any gain at all in solving design problems.

For such investigations the behavioral scientist has developed correlational techniques that offer considerable promise. Surveys and questionnairs (when properly designed); indices of efficiency, accuracy, and speed of behavior; evaluations of comfort or convenience; all these can be worked out to fit the designer's needs. Case studies in depth, field observations, journal records, film or television-tape recording, computer aids and simulations, each

can be adapted to the process of evaluating planning criteria.

Answering the question, "How good were my predicitons?" is thus, the third area in which psychology can be useful to designers.

So there you have a synopsis of appropriate methods. For programming functional requirements, we offer training in making quantified measurements of behavior; for selection of specific design choices, we can apply experimental techniques for evaluating particular design variables; and for the validation of planning criteria, we have surveys, case studies, and similar measurements.

These have been some of our views about multi-disciplinary approaches to planning. I have mentioned working principles that have grown out of our own experiences as a planning team, I have described a few generalizations that we have learned to look upon with wary eyes, and I have noted that the psychologist has specific tools that he can employ to advance the goals of a planning or design group.

At last, let me revert to the fable of the elephant and the committee. Perhaps, if professionals from many fields encourage the existing tendency toward cooperative planning, there may come a day when we can actually please the elephant....and maybe even his wife.

That would be a fine thing.